Received: 14 October 2016 | Revised: 8 February 2018 | Accepted: 13 March 2018

DOI: 10.1111/eip.12715

WILEY

ORIGINAL ARTICLE

Long-term improvements after mindfulness-based group therapy of depression, anxiety and stress and adjustment disorders: A randomized controlled trial

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Background: Although mindfulness-based group therapies (MGTs) for depressive, anxiety or stress and adjustment disorders are promising, there is a substantial lack of knowledge regarding the long-term improvements after such therapies in these common psychiatric disorders.

Methods: Two hundred and fifteen patients were randomized in a randomized clinical trial (RCT) (ClinicalTrials.gov ID: NCT01476371) conducted in 2012 at 16 primary healthcare centres in southern Sweden. The patients were randomized to MGT or treatment as usual (TAU) and completed four psychometric self-rated scales after 8 weeks of treatment. Approximately 12 months after the completion of the 8-week treatment, the same scales were repeated. Ordinal and generalized linear-mixed models, adjusted for cluster effects, were used for the analysis.

Results: For all four psychometric scales (MADRS-S [Montgomery-Åsberg Depression Rating Scale-S], HADS-D, HADS-A [Hospital Anxiety and Depression Scale A and D] and PHQ-9 [Patient Health Questionnaire-9]) the scores at the 1-year follow-up were significantly improved (all *P* values <0.001) in both groups. Furthermore, there were no significant differences between the MGT and TAU in the psychometric scores at the 1-year follow-up.

Conclusions: To the best of our knowledge, this is the first RCT comparing the long-term improvements after MGT with TAU. Although it cannot be excluded that our findings are a result of the natural course of common psychiatric disorders or other factors, they suggest a long-term positive improvement after both MGT and TAU.

KEYWORDS

anxiety, depression, mindfulness, primary healthcare, randomized controlled trial

1 | INTRODUCTION

Patients with depression, anxiety and stress and adjustment disorders are common in primary healthcare; prevalence rates range between 12% and 32%. These disorders cause substantial mental suffering, particularly in female patients (Berardi et al., 1999; Bodlund, Andersson, & Mallon, 1999; Nordstrom & Bodlund, 2008; Parikh, Lin, & Lesage, 1997; Vazquez-Barquero et al., 1997). Treatment for depressive, anxiety and stress and adjustment disorders often includes different types of psychotherapies in addition to pharmacological treatment. Cognitive behavioural therapy (CBT) has been recognized as an effective way of treating depressive disorders (Cuijpers et al., 2013; Oei, Bullbeck, & Campbell, 2006) and is the standard treatment of depression and anxiety in Swedish primary healthcare. In the county of Scania, situated in southern Sweden, clinical psychologists and social counsellors who are employed at the primary healthcare centres, mainly treat patients with CBT on an individual basis. However, such one-to-one treatment is in short supply and the individual therapeutic approach is expensive. A stronger focus on group therapy in primary healthcare could help to save limited resources.

Mindfulness-based therapies can be used in group sessions in primary healthcare after which the patients may practise mindfulness on their own. A large advantage with such therapies is that mindfulness instructors, who typically have prior experience as doctors,

psychologists, social counsellors, nurses or physiotherapists, can lead mindfulness-based group therapies (MGTs) after completing a 6-day course. Previous studies have shown very promising results of such therapies. For example, a meta-analysis published in *JAMA* showed that mindfulness-based therapies are effective at preventing recurrent depression (Kuyken et al., 2016). Furthermore, a practice review showed that mindfulness-based therapies decrease depressive symptoms and anxiety and reduce psychological distress (Davis & Hayes, 2011). The practice review found that mindfulness therapies were also associated with reduced physical illness, improved well-being, increased self-control, decreased negative affect, better affect tolerance and improved concentration, focus, attention and working memory (Davis & Hayes, 2011). Another review and meta-analysis of systematic reviews of randomized clinical trials (RCTs) found evidence for significantly decreased depressive, anxiety and stress symptoms, and improved quality of life after mindfulness-based therapies (Gotink et al., 2015).

In a RCT, conducted by our research group in 2012, patients (n = 215) were randomized to treatment as usual (TAU) or MGT at 16 primary healthcare centres. When assessed at the 8-week follow-up, the results showed that there was no significant difference between the MGT and TAU in alleviating symptoms in patients with depressive, anxiety or stress and adjustment disorders (Sundquist et al., 2015). The findings of our RCT suggest several potential clinical implications, namely that MGTs may be used in primary care patients with depressive, anxiety or stress and adjustment disorders. This has the potential to save limited resources compared to individually based therapy approaches.

There is, however, a substantial lack of long-term follow-up studies of the improvements after MGTs in comparison with individual therapeutic approaches; thus, the present study fills an important gap in the literature. The overall aim of this follow-up study, based on our RCT, was to compare the improvement in psychometric scores after MGT with TAU 1 year after completion of the 8-week intervention in patients with clinical diagnoses of depressive, anxiety or stress and adjustment disorders in 16 primary healthcare centres in southern Sweden. We hypothesized that the scores on four psychometric scales would be improved in both groups at the 1-year follow-up and that there would be no significant differences between the mindfulness and TAU groups in this improvement.

2 | MATERIALS AND METHODS

2.1 | Mindfulness-based therapies

Mindfulness-based therapies include mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT) (Chiesa & Serretti, 2011; Huijbers et al., 2012; Kuyken et al., 2010; Segal, Williams, & Teasdale, 2002). MBSR is a clinically based method with developed manuals and standardized techniques (Marchand, 2012) and MBCT is based on an integration of MBSR with CBT (Chiesa & Serretti, 2011). In this study, we used MGT developed for Swedish primary healthcare using manuals and standardized techniques adapted and modified from MBSR/MBCT. MGT (in Swedish: Här and Nu = here and now) has been used in Sweden for teaching more than 1500 mindfulness instructors since 2005.

2.2 | Training of instructors

Our goal was to train two instructors per participating primary healthcare centres. Two of the 16 primary healthcare centres were relatively small and located close to each other and were therefore given permission to work together. In contrast to MBSR instructor training, no previous meditative experience was required. The MGT instructor training programme used in the present study was also shorter compared to MBSR, in order to adapt it for clinicians and healthcare workers in primary healthcare. In total, 30 clinically experienced healthcare workers received the training programme at our department at the Center for Primary Health Care Research, Malmö, Sweden. The instructors working at the included primary healthcare centres had a background as psychologists, social counsellors, nurses, physiotherapists or doctors. The training was given during 6 days that were evenly spread out between September and December 2011. All sessions were led by Dr Ola Schenström and L.M.J. Dr Ola Schenström was trained at the Center for Mindfulness in Medicine, Health Care, and Society, founded by Professor Jon Kabat-Zinn at the University of Massachusetts, USA. Dr Ola Schenström is a leading expert in mindfulness education in Sweden and L.M.J. is a psychiatrist, associate professor and licensed psychotherapist with long clinical experience of mindfulness therapy. One important advantage implementing MGT is that the trained instructors can give MGT according to the programme after a 6-day course given as 1 + 2 + 2 + 1 days over 3 months that includes 20 to 30 minutes of daily practice. A key part of the instructors' own mindfulness training was to guide individuals and groups in the mindfulness exercises. The aim was to develop a greater awareness and an increased ability to regulate thoughts, feelings and bodily sensations to thus be able to cope better with stress, anxiety, depressive thoughts and difficulties in everyday life. All the 30 participants completed the 6-day course, passed the oral examination and became certified mindfulness instructors. The MGT used in this study was adapted and modified from MBSR therapy and MBCT that are standardly used internationally. Although there are no nationwide or European-wide agreements of a manual for education or certification of mindfulness instructors, our adapted MGT has been used in Sweden for teaching more than 1500 mindfulness instructors since 2005. The mindfulness instructors educated in this RCT were employees at the primary healthcare centres and had backgrounds as psychologists, social counsellors, nurses, physiotherapists or doctors. They were certified by the Center for Primary Health Care Research at Lund University when they had passed the oral examination for mindfulness instructors.

2.3 | Recruitment of primary healthcare centres

The present RCT was conducted in the county of Skåne, the southernmost region in Sweden (Sundquist et al., 2015). Out of a total of 150 primary healthcare centres from all parts of the region, 24 were randomly selected in order to achieve a geographic representativeness

of the whole county. Sixteen of the healthcare centres agreed to participate.

2.4 | Recruitment of patients

Each participating primary healthcare centre was responsible for the recruitment of patients who fulfilled the inclusion criteria; for details see Sundquist et al. (2015). The recruitment of patients started on January 4, 2012, and ended on March 22, 2012. Only those who sought treatment for depression, anxiety or stress and adjustment disorders during the recruitment period were considered for inclusion in the study (Sundquist et al., 2015). All participants underwent pharmacological treatment, if deemed necessary, and follow-up by a doctor at the primary healthcare centre. After the consultation, the patient was asked to fill in four self-rated depression and anxiety scales.

2.5 | Self-rated psychometric scales and cut-offs

The following screening and evaluation instruments were used: (Sundquist et al., 2015) the Montgomery-Åsberg Depression Rating Scale (MADRS-S), the Hospital Anxiety and Depression Scale (HADS, A and D) and the Patient Health Questionnaire (PHQ)-9. One or more of the following were necessary for inclusion in the study: (1) a score between 13 and 34 on the MADRS-S scale, (2) a score ≥7 on the HADS-A scale, (3) a score ≥7 on the HADS-D scale or (4) a score ≥10 on the PHQ-9 scale. The rationale for using multiple scales to assess symptoms of depression and anxiety is that different scales are used in clinical practices worldwide; this also increase the generalizability of our results, as well as the robustness of our findings. In the use of MADRS-S, an upper limit for the score was set in order to exclude participants with severe depression, whereas no upper limit was set for HADS-A, HADS-D and PHQ-9. The rationale for this decision was that previous research comparing the HADS-D and PHQ-9 has shown that they differ considerably in how they categorize severity and that further work is needed to assess the validity of the severity cut-off bands of these scales (Cameron, Crawford, Lawton, & Reid, 2008).

2.6 | Randomization

The mindfulness instructors recruited participants who were eligible for inclusion in the study from their primary care centre. For more detailed information about the randomization process see Sundquist et al. (2015). The randomization protocol was designed by the Competence Centre for Clinical Research at Lund University and included a list with the numbers 1 to 20 for each primary healthcare centre. Each number corresponded to the allocation to the mindfulness or the control group and participants were added to the list in the order in which they signed the informed consent form. Once allocated to one of the two groups, the participants were not allowed to change group. The allocation was blinded, that is, the mindfulness instructors did not know during the allocation the group to which they were assigning each patient.

2.7 | Intervention

The programme used in the present study, MGT, was mainly based on the two mindfulness-based therapies: MBSR (Kabat-Zinn, 2003; Kabat-Zinn et al., 1992; Kabat-Zinn, Lipworth, Burncy, & Sellers, 1986) and MBCT (Chiesa & Serretti, 2011; Huijbers et al., 2012; Kuyken et al., 2010; Segal et al., 2002) (see above). It included structured and controlled meditative exercises. The period of intervention varied somewhat between the different sites. The first and last mindfulness session took place on January 26, 2012, and May 15, 2012, respectively, in the 16 primary healthcare centres. The MGT lasted 8 weeks and was given in 2-hour sessions, once a week. The participants were also instructed to practice mindfulness at home for 20 min/d and were given a CD, a training manual and a diary for this purpose. On average, the participants undertook 102 individual-based mindfulness sessions, including a mixture of daily mindfulness meditation sessions with mindful exercises in common daily situations (SD = 44, range 0-219). Two mindfulness instructors were present at each group session. Each of the mindfulness groups consisted of a maximum of 10 participants, with a mean of 8 participants. The time for the sessions was flexible in order to increase the participation rate. Individual attendance at each group session was recorded. On average, the participants attended six group sessions. Participants were asked to wear comfortable clothes and to bring a mat or blanket for some of the exercises. The MGT, used in the present study, is a modified form of MBSR using manuals and standardized techniques developed by Dr Ola Schenström. It was adapted for primary healthcare and included 34 hours of home training for the patients, compared with 70 hours in MBSR.

2.8 | Control group

The control group received TAU, which could have included pharmacological treatment. Most of the TAU patients received individual CBT and a few received psychodynamic therapy (see Table 1) by psychologists and social counsellors with specific therapeutic competence in CBT or psychodynamic therapy that is licensed by The National Board of Health and Welfare in Sweden. The average number of individual CBT sessions was also six, identical to the mindfulness intervention. We judged that each group had a similar amount of professional contact. Although the mindfulness group sessions lasted 2 hours and the controls received 1 hour of individualized therapy at each session, the participants in the mindfulness group sessions did not receive any individualized attention. The TAU control sessions were given by a professional with a degree in psychotherapy. We therefore judged that the 1 hour individualized session with a psychotherapist is similar to a 2-hour group session with eight individuals.

2.9 | Site visits

To ensure data credibility, patient integrity and patient safety, a research team consisting of one research nurse, one psychologist and one project administrator supported all sites at monitoring visits.

TABLE 1 Characteristics at baseline stratified by group (mindfulness and TAU control) for patients randomized, those lost to follow-up after 1 year and those remaining in the study after 1 year

	Patients randomized (*n* = 215)			Lost to follow-up (*n* = 97)			Completed 1 year follow-up (*n* = 118)		
	Mindful-ness *n* = 110	TAU control *n* = 105	*P*[a]	Mindful-ness *n* = 48	TAU control *n* = 49	*P*[a]	Mindful-ness *n* = 62	TAU control *n* = 56	*P*[a]
MADRS-S, *n*	108	103		47	47		61	56	
Median score (IQR)	20 (11)	23 (9)	0.045	22 (12)	23 (9)	0.853	19 (9)	23 (7.9)	0.006
Mean (SD)	20 (7.7)	22 (6.9)		22 (8.6)	22 (6.5)		19 (6.7)	22 (7.3)	
Missing, % (*n*)	1.8 (2)	1.9 (2)		2.1 (1)	4.1 (2)		1.6 (1)	0 (0)	
HADS-D, *n*	110	105		48	49		62	56	
Median score (IQR)	8 (5)	9 (4)	0.050	8 (5.5)	10 (4)	0.131	8 (4)	8 (5)	0.337
Mean (SD)	8.5 (3.6)	9.3 (3.7)		9 (3.8)	9.9 (3.1)		8.1 (3.4)	8.7 (4.1)	
Missing, % (*n*)	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	
HADS-A, *n*	110	105		48	49		62	56	
Median score (IQR)	12 (6)	13 (4)	0.059	13 (6)	13 (5)	0.725	11 (6)	14 (5)	0.040
Mean (SD)	12 (3.7)	13 (3.2)		13 (3.8)	13 (3.1)		12 (3.5)	13 (3.3)	
Missing, % (*n*)	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	
PHQ-9, *n*	110	105		48	49		62	56	
Median score (IQR)	12 (11)	14 (7)	0.127	15 (9)	14 (6.7)	0.704	11 (9)	13 (8.5)	0.024
Mean (SD)	13 (6)	14 (5.2)		14 (6.2)	14 (5)		12 (5.6)	14 (5.4)	
Missing, % (*n*)	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	
Age, *n*	110	105		48	49		62	56	
Mean age in years (SD)	42 (11)	41 (11)	0.475	40 (10)	41 (11)	0.477	43 (11)	40 (11)	0.132
Missing, % (*n*)	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	
Sex, *n*	110	105		48	49		62	56	
Men/women (%)	19/81	10/90	0.076	25/75	14/86	0.184	15/85	7/93	0.202
Missing, % (*n*)	0 (0)	0 (0)		0 (0)	0 (0)		0 (0)	0 (0)	
Education, *n*	108	101		46	45		62	56	
Low/middle/high (%)	7/44/47	11/33/51	0.267	10/40/45	20/29/43	0.296	5/47/48	4/38/59	0.517
Missing, % (*n*)	1.8 (2)	3.8 (4)		4.2 (2)	8.2 (4)		0 (0)	0 (0)	
Marital status, *n*	107	101		46	46		61	55	
Married/single/divorced (%)	63/20/15	65/18/13	0.911	58/29/8	61/14/18	0.115	66/13/19	68/21/9	0.174
Missing, % (*n*)	2.7 (3)	3.8 (4)		4.2 (2)	6.1 (3)		1.6 (1)	1.8 (1)	
Antidepressants, *n*	95	95		42	44		53	51	
Yes/no (%)	35/52	35/55	0.882	40/48	41/49	0.984	31/55	30/61	0.788
Missing, % (*n*)	13.6 (15)	9.5 (10)		12.5 (6)	10.2 (5)		14.5 (9)	8.9 (5)	
Anxiolytics, *n*	92	89		37	41		55	48	
Yes/no, %	16/67	16/69	0.937	21/56	18/65	0.602	13/76	14/71	0.767
Missing, % (*n*)	16.4 (18)	15.2 (16)		22.9 (11)	16.3 (8)		11.3 (7)	14.3 (8)	
CBT, *n*		80			31			49	
Physical activity therapy, *n*		2			0			2	
None, *n*		8			8			0	

Abbreviations: CBT, cognitive behavioural therapy; HADS, Hospital Anxiety and Depression Scale; IQR, interquartile range; MADRS, Montgomery-Åsberg Depression Rating Scale; PHQ, Patient Health Questionnaire; TAU, treatment as usual.

[a] Tests for differences between mindfulness and TAU control groups.

2.10 | Eight-week follow-up

Immediately after the 8-week intervention, all participants were asked to come to the primary healthcare centre to be evaluated for psychiatric symptoms using the same scales as described above.

2.11 | One-year follow-up

Approximately 1 year after completion, the same psychometric scales were mailed to all participants in the MGT and TAU groups. The data and results presented in this study are based on the 1-year follow-up after the 8-week intervention.

2.12 | Ethical considerations and handling of personal data

The study was conducted according to the principles of the Declaration of Helsinki. It was approved by the Ethics Committee of Lund University prior to its commencement on October 5, 2011 (application

no. 2011/491). All participants gave their written informed consent. All data were analysed anonymously. During the intervention, identification lists were kept in a secure location. Names and personal identification numbers (the Swedish version of social security numbers) were replaced with anonymous serial numbers, which were associated with all questionnaires throughout the study. The results are reported at the group level and it is not possible to identify individuals.

2.13 | Statistical analyses

All analyses were repeated for the four outcome scales: MADRS-S, HADS-A, HADS-D and PHQ-9. Differences in baseline characteristics between the mindfulness and control groups were tested using the Wilcoxon rank sum test for medians, Student's *t* test for means and the χ^2 test for proportions (Table 1). The analysis in Table 1 was repeated for those lost to follow-up after 1 year and those remaining in the study after 1 year. Within-group analyses (median change between baseline and follow-up in the mindfulness and control groups) were performed using the Wilcoxon signed-rank test (Table 2). The rationale for having the main focus on medians rather than means was the ordinal nature of our data: all scales for the assessments of depressive symptoms and anxiety were based on ordinal data. To test the robustness of our analyses, we also analysed the data based on mean scores and in a continuous manner; the results were almost identical (Figure 2 and Table 4). Due to the potential cluster effects or correlation of measurements within individuals as well as within primary healthcare centres, we used an ordinal mixed model (in this case, a proportional odds mixed model with individuals at first level and primary healthcare centres at second level). This analytic approach was used to examine the potential treatment effect of mindfulness and TAU on the outcome (change from baseline), adjusted for the baseline score and taking the potential cluster effects into account. One important advantage with mixed models is that all available data are used under the missing at random assumption (although the missing completely at random assumption is not fulfilled), which means that data from those who drop out as well as data from those who complete the study can be used. All scales were categorized and odds ratios were estimated using ordinal logistic regression models (the proportional odds model relaxes the assumption of identical log odds over all levels of the outcome). An interaction term between time and randomization group was created (Tables 3 and 4). Patients who had not responded to three or more items on the scales were counted as missing for that scale. For those who had missing values for one or two items, the mean number of points for the questions they had responded to was used to impute values for the missing questions. StataCorp. 2011. Stata Statistical Software: Release 12. (College Station, TX: StataCorp LP) was used for all statistical analyses.

3 | RESULTS

In total, 215 eligible patients at the 16 primary healthcare centres were randomized to either mindfulness (n = 110) or TAU, that is, the control group (n = 105). Figure 1 shows the randomization, drop-out and observed cases at the first (8 weeks) and the second follow-up (1 year). The main reasons for drop-out at the first follow-up were work commitments and lack of time. Other reasons included moving between houses, illness, no desire for treatment and disappointment at being randomized to the control group. We tested the difference between the mindfulness and control groups regarding the association between drop-out and scores after the baseline examination and found no significant differences.

Table 1 shows baseline characteristics and missing data in the mindfulness and control group. The mean age was 42 years in the mindfulness group and 41 years in the control group. Women, as well as individuals with a middle or high level of education, were in large majority in both groups. About two-thirds were married. The majority of patients were not on medication for depression or anxiety. There were no significant differences in sociodemographic characteristics or medication prescription between the two groups. The *P*-values for treatment with antidepressants and anxiolytics were 0.88 and 0.94,

TABLE 2 Median scores and number of observed cases at baseline and follow-up in the mindfulness and TAU control groups

	Mindfulness (n = 110)						TAU control (n = 105)					
	Baseline		Follow-up (8 weeks)		Follow-up (1 year)		Baseline		Follow-up (8 weeks)		Follow-up (1 year)	
	n	Median score	*n*	Median Score	*n*	Median Score	*n*	Median Score	*n*	Median Score	*n*	Median score
MADRS-S	108	20	81	11	62	10	103	23	86	13	56	11
HADS-D	110	8	83	3	62	3.5	105	9	86	5	55	3
HADS-A	110	12	83	7	62	7	105	13	86	9	56	9
PHQ-9	110	12	82	5	61	5	105	14	85	8	56	6

	Difference from baseline (8 weeks) *P*[a]	Difference from baseline (1 year) *P*[a]	Difference from baseline (8 weeks) *P*[a]	Difference from baseline (1 year) *P*[a]
MADRS-S	<0.001	<0.001	<0.001	<0.001
HADS-D	<0.001	<0.001	<0.001	<0.001
HADS-A	<0.001	<0.001	<0.001	<0.001
PHQ-9	<0.001	<0.001	<0.001	<0.001

Abbreviations: HADS, Hospital Anxiety and Depression Scale; MADRS, Montgomery-Åsberg Depression Rating Scale; PHQ, Patient Health Questionnaire; TAU, treatment as usual.

[a] Tested by Wilcoxon signed-rank test.

TABLE 3 Differences (treatment effects) between the mindfulness and TAU control groups, adjusted for cluster effects

	OR (95% CI)	*P*
MADRS-S		
Main effects		
Mindfulness vs TAU control (at baseline)	0.55 (0.28; 1.09)	0.09
8 weeks vs baseline (in mindfulness group)	0.10 (0.06; 0.18)	<0.001
1 year vs baseline (in mindfulness group)	0.08 (0.04; 0.15)	<0.001
Interaction effects		
Mindfulness * 8 weeks	1.09[a] (0.51; 2.31)	0.83[b]
Mindfulness * 1 year	1.33[a] (0.56; 3.19)	0.52[b]
HADS-D		
Main effects		
Mindfulness vs TAU control (at baseline)	0.61 (0.32; 1.15)	0.13
8 weeks vs baseline (in mindfulness group)	0.05 (0.05; 0.17)	<0.001
1 year vs baseline (in mindfulness group)	0.09 (0.03; 0.12)	<0.001
Interaction effects		
Mindfulness * 8 weeks	0.62 (0.29; 1.31)	0.21
Mindfulness * 1 year	1.91 (0.81; 4.52)	0.14
HADS-A		
Main effects		
Mindfulness vs TAU control (at baseline)	0.54 (0.27; 1.07)	0.08
8 weeks vs baseline (in mindfulness group)	0.06 (0.03; 0.11)	<0.001
1 year vs baseline (in mindfulness group)	0.06 (0.03; 0.12)	<0.001
Interaction effects		
Mindfulness * 8 weeks	0.86 (0.40; 1.82)	0.69
Mindfulness * 1 year	1.07 (0.45; 2.55)	0.87
PHQ-9		
Main effects		
Mindfulness vs TAU control (at baseline)	0.62 (0.32; 1.22)	0.17
8 weeks vs baseline (in mindfulness group)	0.08 (0.04; 0.14)	<0.001
1 year vs baseline (in mindfulness group)	0.07 (0.04; 0.13)	<0.001
Interaction effects		
Mindfulness * 8 weeks	0.81 (0.38; 1.74)	0.59
Mindfulness * 1 year	1.11 (0.46; 2.67)	0.81

Abbreviations: CI, confidence interval; HADS, Hospital Anxiety and Depression Scale; MADRS, Montgomery-Åsberg Depression Rating Scale; OR, odds ratio; PHQ, Patient Health Questionnaire; TAU, treatment as usual.

[a] Interaction effect (treatment effect) between time and randomization group.

[b] Treatment effect tested by a random intercept proportional odds model.

TABLE 4 Differences (treatment effects) between the mindfulness and TAU control groups (mean values), adjusted for cluster effects

	Mean difference (95% CI)	*P*
MADRS-S		
Main effects		
Mindfulness vs TAU control (at baseline)	−1.63 (−3.72; 0.45)	0.13
8 weeks vs baseline (in mindfulness group)	−7.78 (−9.44; −6.11)	<0.001
1 year vs baseline (in mindfulness group)	−7.88 (−9.68; −6.08)	<0.001
Interaction effects		
Mindfulness * 8 weeks	0.003[a] (−2.32; 2.32)	1.00[b]
Mindfulness * 1 year	1.25[a] (−1.36; 3.86)	0.35[b]
HADS-D		
Main effects		
Mindfulness vs TAU control (at baseline)	−0.81 (−1.74; 0.13)	0.09
8 weeks vs baseline (in mindfulness group)	−4.33 (−5.10; −3.55)	<0.001
1 year vs baseline (in mindfulness group)	−3.76 (−4.61; −2.92)	<0.001
Interaction effects		
Mindfulness * 8 weeks	−0.65 (−1.74; 0.44)	0.24
Mindfulness * 1 year	0.75 (−0.49; 1.98)	0.24
HADS-A		
Main effects		
Mindfulness vs TAU control (at baseline)	−0.93 (−1.91; 0.05)	0.06
8 weeks vs baseline (in mindfulness group)	−4.23 (−5.00; −3.45)	<0.001
1 year vs baseline (in mindfulness group)	−4.15 (−5.00; −3.31)	<0.001
Interaction effects		
Mindfulness * 8 weeks	−0.28 (−1.37; 0.80)	0.61
Mindfulness * 1 year	0.07 (−1.16; 1.30)	0.91
PHQ-9		
Main effects		
Mindfulness vs TAU control (at baseline)	−1.15 (−2.64; 0.35)	0.13
8 weeks vs baseline (in mindfulness group)	−5.87 (−7.07; −4.67)	<0.001
1 year vs baseline (in mindfulness group)	−5.54 (−6.86; −4.22)	<0.001
Interaction effects		
Mindfulness * 8 weeks	−0.19 (−1.88; 1.49)	0.82
Mindfulness * 1 year	0.90 (−1.01; 2.81)	0.36

Abbreviations: CI, confidence interval; HADS, Hospital Anxiety and Depression Scale; MADRS, Montgomery-Åsberg Depression Rating Scale; PHQ, Patient Health Questionnaire; TAU, treatment as usual.

[a] Interaction effect (treatment effect) between time and randomization group.

[b] Treatment effect tested by a random intercept linear regression model.

respectively. Baseline scores for MADRS-S (23 vs 20, $P = 0.045$) and HADS-D (9 vs 8, $P = 0.050$) were significantly, but only slightly, higher in the control group than in the mindfulness group. The most common type of therapy in the control group was individual CBT ($n = 80$). No one in the mindfulness group received CBT. Since the attrition rate (the proportion of sample members randomly assigned to the study groups for whom outcome data are not available) was high (45%) we repeated the analyses in Table 1 for patients lost to follow-up after 1 year as well as patients remaining in the study after 1 year.

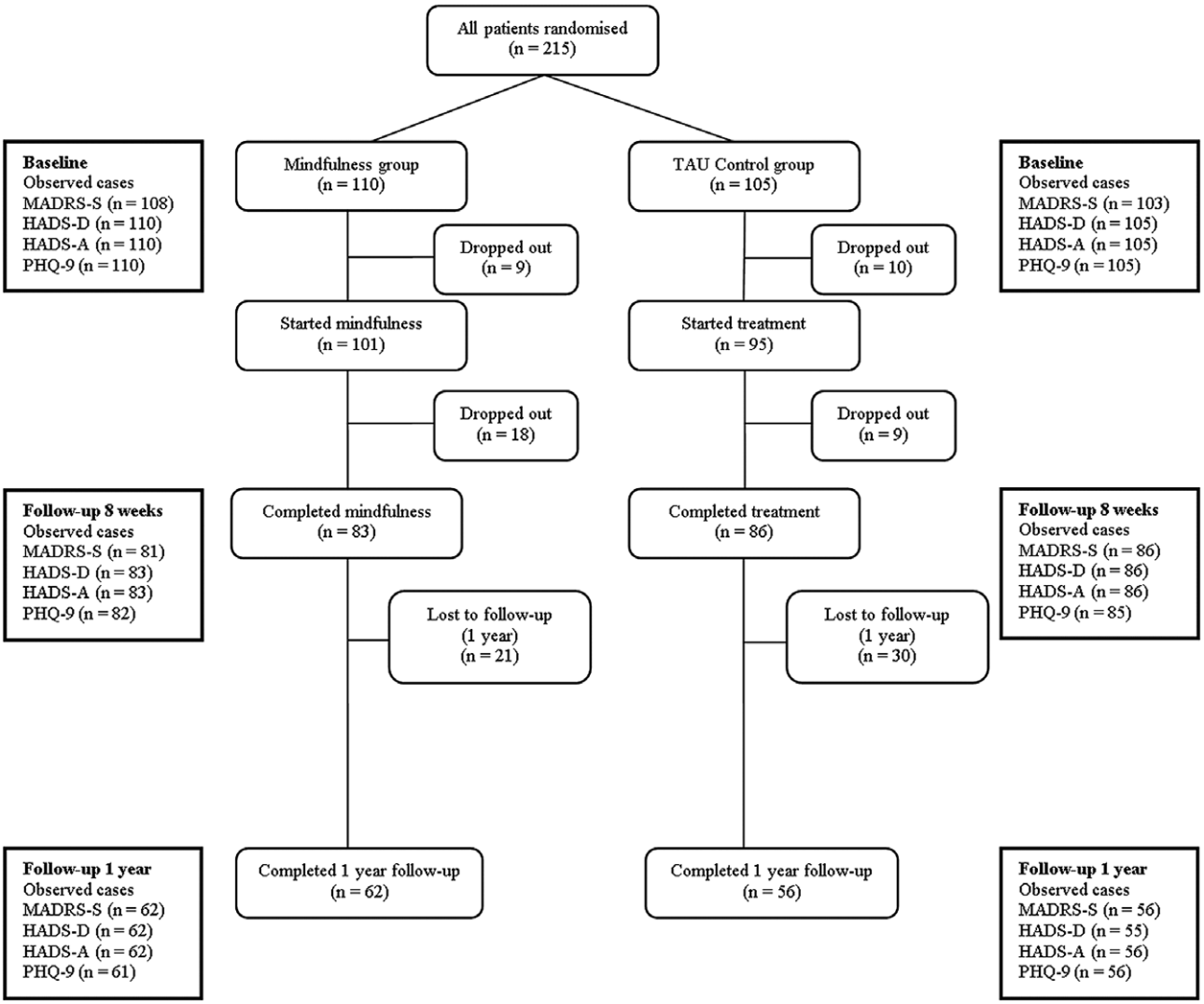

FIGURE 1 CONSORT flow diagram showing randomization, drop-out and completion of 1 year follow-up in the mindfulness and TAU control groups

Compared to those remaining, the patients lost to follow-up were generally male, lower educated and had more antidepressants and anxiolytics. They also scored slightly higher on the scores and the difference in scores between the mindfulness and the control group were more profound for the remaining participants (median score MADRS-S 19 in the mindfulness group and 23 in the control group, *P*-value 0.006).

Table 2 shows the median scores and the number of cases at baseline and follow-up at 8 weeks and 1 year, respectively, in the mindfulness and control groups. Before the treatment started, the scores indicated mild to moderate symptoms of depression and anxiety. The scores in the mindfulness group as well as in the control group were almost identical between 8 weeks and the 1-year follow-up. MADRS-S at the first follow-up was 11 in the mindfulness group and 13 in control group; at the 1-year follow-up it was 10 in the mindfulness group and 11 in the control group. This can also be seen in Figure 2, where the mean scores in the two groups are shown. For all four scales, the median scores decreased significantly in both groups compared to baseline; all *P*-values were <0.001. The estimated differences in Table 2 are based on median scores.

Table 3 shows the main effects in the mindfulness group as well as the interaction effects to test the differences between the mindfulness and the control group. The first three odds ratios for all scales show the difference between the mindfulness and TAU controls at baseline, as well as the improvement after the intervention in the mindfulness group at the first and second follow-up. The two interaction effects show the potential additional effect of being in the mindfulness group compared to the control group after 8 weeks and after 1 year.

For all scales, the difference between the mindfulness and control group at baseline was non-significant and the improvement after the intervention was significant both after 8 weeks and after 1 year of follow-up. The largest difference at baseline was found for HADS-A (the odds of scoring higher is 0.54 times [$P = 0.08$] lower in the mindfulness group than in the control group). No significant differences between the mindfulness and control groups were found for any of the scales. The largest difference was found for HADS-D, where the difference between the groups (TAU vs mindfulness) after 1 year was 1.91 ($P = 0.14$), meaning that the decrease in the odds of scoring higher on HADS-D after 1 year was 0.09/1.91 = 0.05 times in the

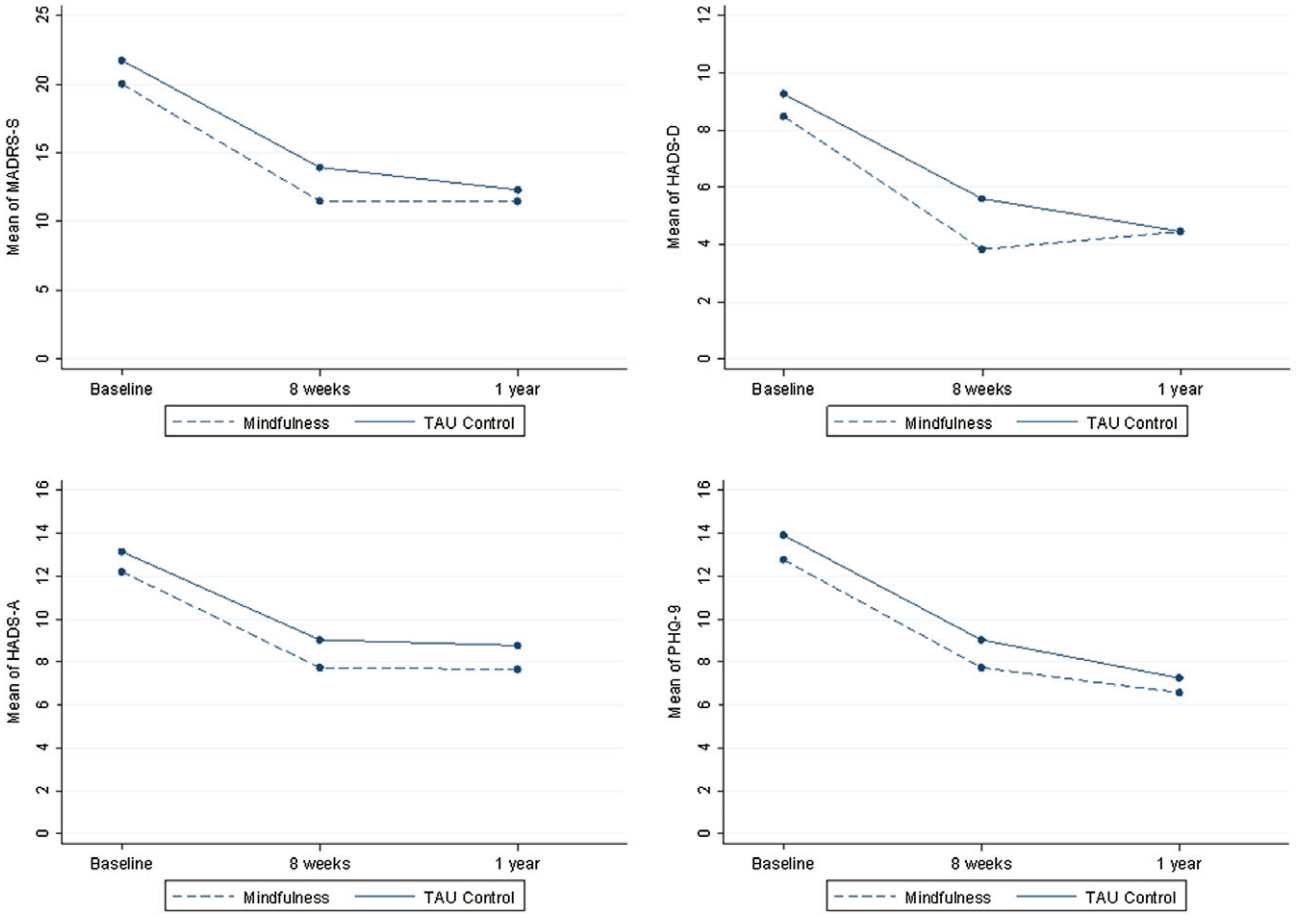

FIGURE 2 Change in mean score at baseline and follow-up in mindfulness and TAU control group

control group compared to 0.09 times in the mindfulness group, which is not significant.

The estimated differences in Table 4 were based on mean values instead of odds and resulted in the same conclusions as in Table 3.

We also calculated the variance between primary healthcare centres (second-level variance) to obtain a measure of potential cluster effects (ie, correlation of individuals within primary healthcare centres). This variance was very small compared to the individual variance (rho = 0), indicating almost no cluster effects. Despite the small variance in the scores of the four psychometric scales, all estimates in Tables 3 and 4 were adjusted for cluster effects.

4 | DISCUSSION

The main findings of the present study are that there were significant improvements in psychometric scores 1 year after completion of the 8-week MGT or TAU and that there were no significant differences between the two groups. Although it cannot be excluded that our findings are a result of the natural course of common psychiatric disorders or other factors, they may suggest a long-term improvement after both MGT and TAU in patients with clinical diagnoses of depressive, anxiety and stress and adjustment disorders, when the patients are followed for 1 year. To the best of our knowledge, this is the first RCT performed in a primary healthcare setting in which the long-term (1-year) improvement after MGT has been compared with an active control group (TAU).

A recent meta-analysis based on 19 studies showed that mindfulness- and acceptance-based interventions are associated with robust and substantial reductions in symptoms of anxiety and comorbid depression (Vollestad, Nielsen, & Nielsen, 2012). Regular practising of mindfulness may decrease vulnerability to cognitive and emotional reactions that lead to stress and other psychological problems (Teasdale, Segal, & Williams, 2003). Other studies have shown that mindfulness may have positive effects on affective experience (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010), as well as on cognition and pain (Zeidan, Gordon, Merchant, & Goolkasian, 2010; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Although a growing body of research has examined the potential effect of mindfulness on somatic as well as psychiatric conditions, the scientific knowledge gained from RCT studies is scarce. Moreover, no study has had such a long follow-up time as this RCT. Furthermore, a review based on 15 various types of studies found that assortment in the methodologies, focus and aims were evident in previously conducted studies (Toneatto & Nguyen, 2007). Although about half of the studies (8 of 15) reported a statistically significant reduction in symptoms of anxiety or depression after mindfulness-based therapy, none had included an active control group for comparison. Examples of previous studies include a Danish clinical trial in which the authors carried out a structured 8-week group-based mindfulness-based programme with

336 women who had been operated on for breast cancer (Würtzen et al., 2013). The 8-week intervention had statistically significant and clinically meaningful depression and anxiety at follow-up and medium to large effect sizes. A Norwegian RCT was based on 76 participants randomized to an MBSR programme or a waiting-list, that is, not active, control group. Those that completed the treatment showed medium to large effect sizes on measures of anxiety and a large effect size on symptoms of depression. The authors concluded that MBSR may be an effective treatment for anxiety disorders, depression and related symptomatology (Vøllestad, Sivertsen, & Nielsen, 2011).

The present study has several strengths. For example, the use of an RCT with an active control group and a 1-year follow-up period are major contributions to this relatively under-researched field. Moreover, our study on 215 randomized patients with a clinical diagnosis was performed in a monitored clinical setting at 16 primary healthcare centres in both urban and rural areas. Another strength is that we calculated the variance between primary healthcare centres (second-level variance) to obtain a measure of potential cluster effects and all estimates in Tables 3 and 4 were adjusted for cluster effects. There are also some limitations. For example, immigrants who could not speak Swedish fluently were not included in the RCT. In a country like Sweden, which has a large proportion of immigrants, it would have been a better approach to include non-Swedish-speaking immigrants as well. However, as the Swedish immigrant population is very heterogeneous, that is, many different languages are spoken, it would not have been feasible to conduct a reliable study of the many different immigrant groups in the country within the scope of the present study. Another limitation is that the "missing completely at random assumption" was not fulfilled, which may influence generalizability. However, the attrition rate during the 1-year follow up was similar in both groups (44% for the mindfulness group and 47% for the TAU control group). Since the attrition rate was not different between the two groups, there is only a small likelihood that a substantial drop-out bias occurred, that is, the potential bias is most likely non-differential between the two groups. In addition, the use of mixed models allowed us to use data from those who dropped out as well as data from those who completed the study. In a recent meta-analysis including 19 studies, the attrition rates varied between 0% and 46% (Vollestad et al., 2012). In many of these studies the follow-up time was shorter than in our study (1 year), which may decrease the attrition rate. There were slight differences in the baseline scores for MADRS-S and HADS-D between the mindfulness and control groups. This difference was more profound when examining the participants lost to follow-up and the participants remaining in the study. However, all results were adjusted for baseline scores. Another limitation is that the only aspect that was blinded was the randomization and all outcome measures were based on self-report—having blind raters and clinician-rated measures would have added to the rigour of the study. We did not adjust for further potential treatment after the 8-week intervention as we had no information about treatment after this time point in any of the two groups. Finally, we had no access to treatment data from non-participating primary healthcare centres and previous research in the United Kingdom has shown that there are variations in, for example, psychotropic prescribing by primary healthcare physicians. Another study from the United Kingdom found, however, that demographic factors were more powerful determinants of prescribing patterns than characteristics of the practice itself (Tsimtsiou, Ashworth, & Jones, 2009), which indicates that differences between primary healthcare centres should have a smaller impact than individual demographic factors on potential variation between primary healthcare centres.

As patients who receive antidepressants only have a remission rate of 35% to 40% (Fava et al., 2003), the improvement after additional treatments, such as mindfulness, need to be explored. The findings of the present study therefore have several potential clinical implications as MGTs may be used in primary care patients with depressive, anxiety or stress and adjustment disorders. Another important clinical implication is that mindfulness instructors, who do not necessarily need to be psychologists or counsellors, can give mindfulness-based therapy to a group of patients with common psychiatric symptoms in primary care. We would also like to stress that psychotherapists are in short supply and that a stronger focus on group therapy given by mindfulness instructors could contribute to saving limited resources. However, it is vital to note that not all patients are suitable for participation in group sessions and it is therefore important to offer an individual therapeutic approach to these patients.

5 | CONCLUSION

At the 1-year follow-up, the scores were significantly improved for all four psychometric scales in the two groups and there were no significant differences in psychometric scores between the MGT and TAU. Although it cannot be excluded that our findings are a result of the natural course of common psychiatric disorders or other factors, the results support previous research showing that MGT can be helpful in reducing psychiatric symptoms. This is promising; as psychotherapists are in short supply, MGT has the potential to help a higher number of patients with depressive, anxiety and stress and adjustment disorders in primary healthcare than individualized psychotherapies.

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How to cite this article: Sundquist J, Palmér K, Memon AA, Wang X, Johansson LM, Sundquist K. Long-term improvements after mindfulness-based group therapy of depression, anxiety and stress and adjustment disorders: A randomized controlled trial. *Early Intervention in Psychiatry*. 2018;1–10. https://doi.org/10.1111/eip.12715